

# Laser Diode Manufacturers Using Free-Standing GaN Wafers

The emergence of cost-conscious and manufacturing-savvy telecom and datacom vendors has prompted many Laser Diode Manufacturers to explore the benefits of free-standing GaN wafers. One Dublin, Ireland-based manufacturer of broadband communications devices uses a proprietary process that eliminates a regrowth step and facilitates epitaxial growth outsourcing. This process has several advantages for Laser Diode Manufacturers, including the ability to produce highly efficient, cost-effective devices.

# Free standing GaN wafers are available for laser diode manufacturers

These are made using different techniques. Hydride vapor-phase epitaxy (HVPE) is one of the most common methods for obtaining free-standing GaN wafers. The growth rate is high and the cost is low. Normally, the process involves the following steps: growth of a buffer layer made of a low-temperature GaN during metal organic chemical vapor deposition (MOCVD), then regrowth of the GaN film. This layer is separated from the foreign substrate through a chemical process.

GaN free-standing substrates exhibit low dislocation densities, which makes them suitable for the manufacturing of laser diodes. These diodes can be used as light sources in projectors and Blu-ray disc drives. Manufacturers of these components should take note of the low dislocation density of these materials. Several factors must be considered in order to make a suitable product.



# Target parameters for laser diode manufacturing

Designing a new laser diode begins with determining the parameters of the desired output. Power and lifetime are the top priorities, but there are other considerations that are equally important. Depending on the intended application, durability may be more important than power, and high temperature operation can be crucial as well. Here are the target parameters for laser diode manufacturing. These parameters may vary with different devices, but a general rule is to strive for a higher efficiency and power.

A successful diode requires careful choreography of all critical build stages. High-power laser diodes have a market that could reach \$450 million by 2006. In order to meet the demands of increasingly sophisticated end users, manufacturers must offer higher power and brightness, as well as longer lifespans. The laser diode manufacturers must carefully choreograph all build stages to achieve the desired result. For example, they must focus on minimizing optical loss and absorption during the epitaxial growth process.

# Problems with laser diode durability

Several factors contribute to the problems with laser diode durability. Most laser diodes are tested under carefully controlled conditions, which exclude the effects of variable external influences. Real-life operating conditions can differ substantially from these conditions, however, and the performance parameters can be degraded. These factors include electrostatic discharges, current spikes, and environmental temperatures. Depending on the particular laser diode and its application, life expectancy may be increased or decreased.

Mishandling of laser diodes can cause damage to the front facet, which is highly susceptible to contamination. Contamination of this front facet can result in irreversible damage or failure of the laser diode. Therefore, it is advisable to use powder-free gloves whenever handling these components. Avoid cleaning or soldering near the front facet, as volatile substances can deposit on the front facet.



# Economic opportunities for laser diode manufacturers

A recent report identifies several lucrative expansion opportunities for **Laser Diode manufacturers**. It breaks down the global market into four regions - Americas, Europe, Asia-Pacific, and Rest of the World. The APAC region accounted for the largest share of the market in 2015 and is expected to grow the fastest between 2015 and 2020. Listed below are some of the top laser diode companies in each region.